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Sentinel DVI Integrated Recorder

User Manual

Issue 1
06/04/11

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1 Introduction

The Thruput **Sentinel DVI Integrated Recorder** converts a Single Link Digital or Analogue video source into a highly compressed loss-less Ethernet video stream. The Thruput Sentinel DVI Integrated Recorder (referred to as **Sentinel Integrated Recorder** for the remainder of this manual) is designed for use in a redundant video recorder system, or as a high-quality video extender.

1.1 Features

- Supports DVI-I connectors
- Lossless high-end video broadcasting over Ethernet
- Proprietary high-compression RLE difference engine
- Optional dual redundant Gigabit Ethernet
- Supports multiple redundant power supplies:
    - Dual power over Ethernet (PoE) – IEEE 802.3af compliant
    - Power from USB
    - External 5V DC supply
- Low-power and silent running (typically 5 Watts)

1.2 DVI Interface

The Sentinel Recorder is capable of emulating a VGA monitor with a maximum resolution of 1600x1200 at 60Hz (Frame Rate). In addition, the Sentinel Integrated

Recorder can be configured to 'snoop' a DVI or VGA signal to an existing monitor up to a maximum resolution of 1600x1200 at 60Hz.

The Sentinel Integrated Recorder supports DVI-I (single-link) which can operate with analogue or digital (single-link) cabling. If the Sentinel Integrated Recorder is programmed to emulate a monitor, then the supported resolution is defined in an EDID EEPROM as defined by the DVI specification.

DVI-I (single link) cable can be easily recognised by its half populated pins, as shown in figure 1.

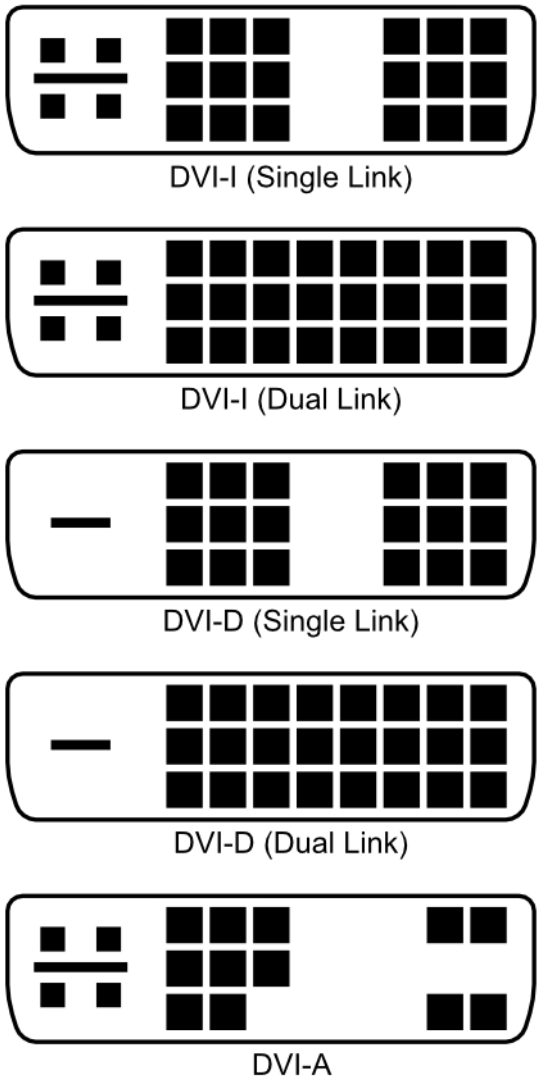


Figure 1: DVI CONNECTOR TYPES

With digital connections, the maximum throughput for Single Link DVI is 165Million pixels/second (165MHz pixel-clock).

As an example, a 1920x1200 monitor at 60Hz refresh rate displays 1920x1200x60 pixels in one second. This would be 138 Million pixels/ second. There is also around 10% of extra time required for the internal timings. Therefore a 1920x1200 @ 60Hz monitor has a pixel clock of 152 MHZ. This is below 165MHz, so the Sentinel Integrated Recorder can be used.

In contrast, a 2560x1600 resolution monitor at 60Hz has pixel clock of 2560x1600x60 (+10%), which is 270MHz.This is above 165MHz, so the graphics card works in DVI Dual Link. This would require the **Sentinel DVI Dual-Link Recorder** product.

It is the responsibility of the user to ensure that the resolution defined by the EDID EEPROM is supported by the video source and the cabling.

1.3 Ethernet Interface

The Sentinel Integrated Recorder is designed to operate on Gigabit Ethernet networks that provide a low-latency and high-bandwidth channel to distribute the data. To ensure loss-less transmission of the video data, Thruput has developed a proprietary high-compression RLE difference engine.

To ensure optimal compression, it is important that users understand how RLE compression operates, as not all video types give the same level of compression.

For video data that consists of large areas of uniform colour, the RLE compression reduces the data traffic considerably. This is done by compressing the pixel data into a different form , for example, 200 pixels of 24-bit data could take 24x200 (i.e. 480 bits) of storage, or could be shortened to pixel + count (i.e. 24+8 bits) of storage.

In addition, by comparing the current frame with the previous frame and only sending the differences, even greater savings can be made. This is because the Sentinel Integrated Recorder can convert complex areas (that would require significant storage even with RLE) and compress this to an instruction such as “just repeat the last frame”.

With difference engine and RLE, slow-moving, vector driven images (such as those found in air-traffic control systems) compress very well.

1.4 Typical At-The-Glass Applications

The Thruput Sentinel Integrated Recorder can be used in a variety of ways.

A typical analogue video system is shown in Figure 2. In words, a passive video splitter is used between two standard length video cables. The mid-connection of the splitter (typically connected to a video source in digital capture mode) is connected to the Sentinel's DVI-I connector (using a video adaptor if necessary). The LAN recording is then configured for single- or dual-redundant operation as per the system level requirements.

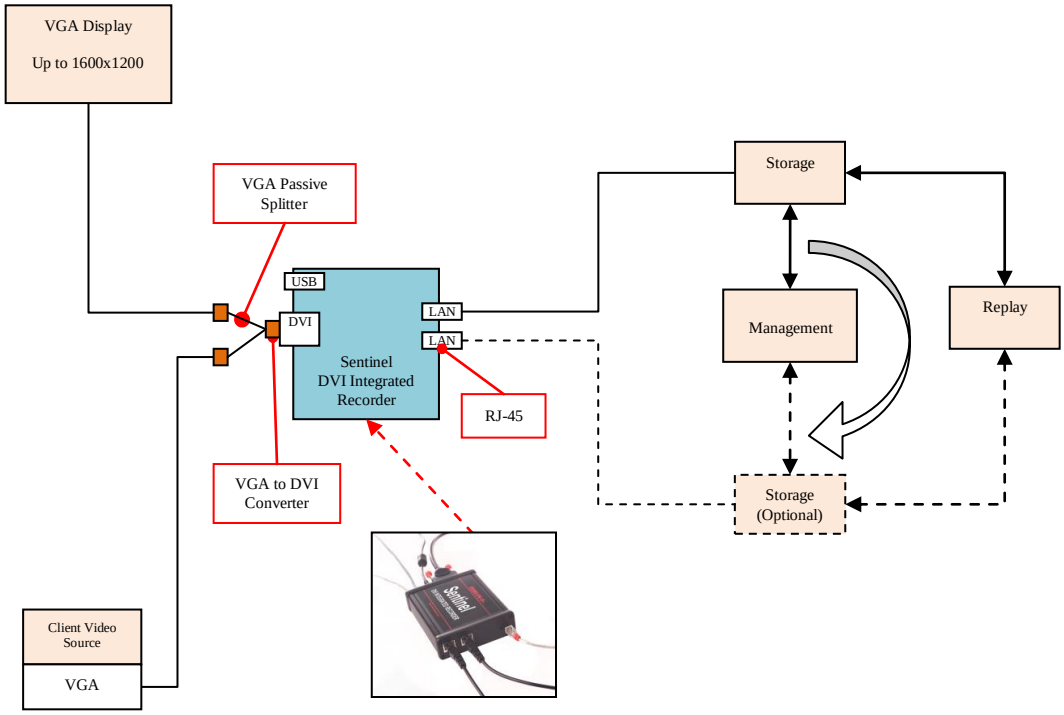


Figure 2: SENTINEL ANALOGUE AT-THE-GLASS RECORDING

A typical single-link DVI passive at-the-glass recording system is shown in Figure 3. In words, a DVI splitter is used to take the signal down two DVI cables. On one cable, the monitor is attached as normal. On the other, the Sentinel DVI Integrated is connected. The LAN recording is then configured for single- or dual-redundant operation as per the system level requirements.

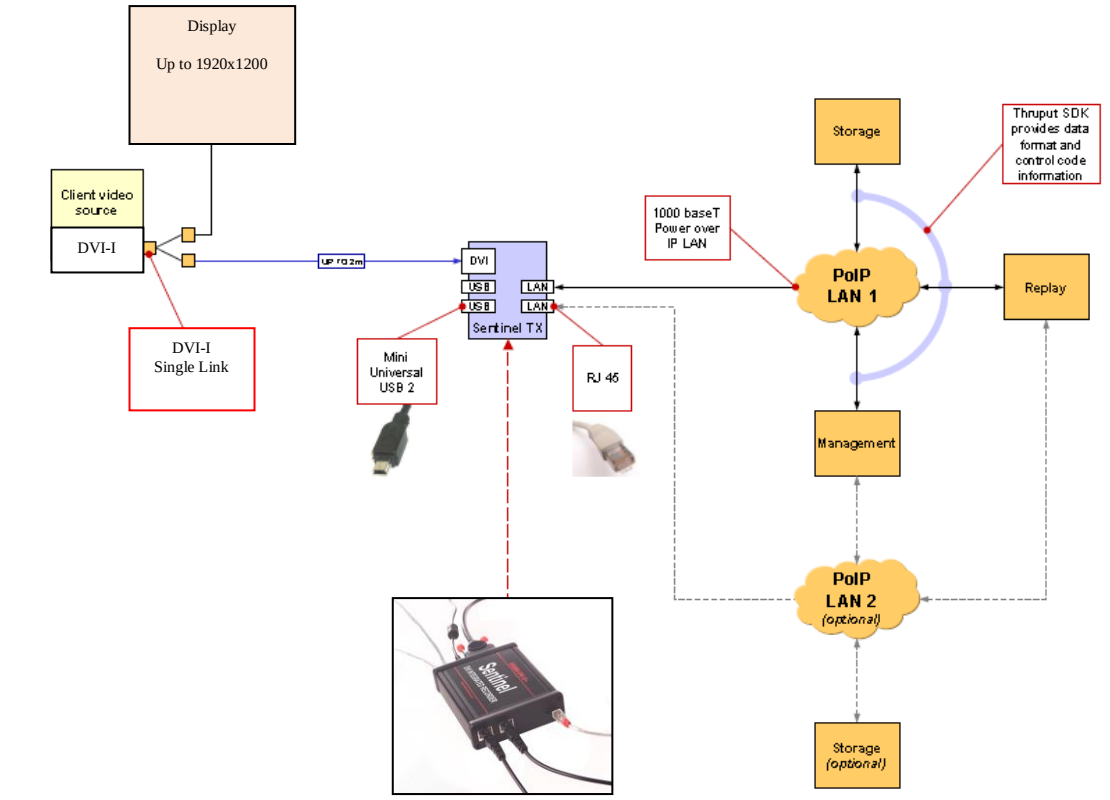


Figure 3: SENTINEL DIGITAL AT-THE-GLASS RECORDING

Please contact Thruput sales for advice and support with specific applications.

1.5 Thruput Sentinel Record and Replay Software

System builders may be interested in the Sentinel Record & Replay system. This software development package provides a turn-key solution for building a high end video record and replay system using the Sentinel Integrated Recorder.

Depending on your requirements, one or more pieces of software may be supplied with the hardware.

Thruput can supply the following products:

- **Sentinel Recorder** – middleware designed to run on the NAS server to convert LAN data into physical data streams across one or more partitions.
- **Sentinel Replay** – fully fledged ATC replay system designed to playback data from a specified time slice. Alternatively, you may be supplied with:
- **Sentinel Replay API** - fully featured dynamic library that can be used to develop custom versions of Replay
- **Sentinel Decoder** – engineering utility that converts compressed video data into discrete bitmaps. Ideal for performing quick tests to check the integrity of the captured data.
- **Sentinel Operational Viewer** – management and/or engineering utility that provides an at-the-glance overview of all active connections. The live views of

the data are ideal for Operational Supervisors as they are current, and can be displayed at their native resolution.

Please contact support or your sales representative for more information.

2 Hardware Features

The Sentinel Integrated can be controlled and monitored using Sentinel Management software. The following features are supported in hardware.

Please consult the software guides for information on how to set these within the hardware.

2.1 Automatic Analogue Detection

By default, the Sentinel Integrated will attempt to automatically detect whether the source is analogue or digital. When both are available, the digital source will be chosen in preference.

To force analogue mode, please ensure that analogue cables are used throughout the system. The final connection to the Sentinel Integrated Recorder may need a video adaptor. Note that the recommended at-the-glass connection is as a daisy chain between the monitor and source video (see Figure 2).

To force digital mode, please ensure that digital cables are used throughout the system. Note that the recommended at-the-glass connection is from the second spur of a passive Y-splitter (see Figure 3).

2.2 At-the-glass recording

The Sentinel Integrated Recorder supports at-the-glass recording which means that the video source can be recorded without loading software onto the host computer, and without affecting the normal monitor operation.

During at-the-glass recording the Sentinel Integrated Recorder will not be detected by the video source computer.

3 Shipping Contents

The Sentinel DVI Integrated Recorder ships with

1. Sentinel DVI Integrated Recorder Unit
2. User Manual
3. Installation CD

3.1 Power supplies

The Sentinel DVI Integrated Recorder is able to use several different sources of power:

- Power over Ethernet (PoE) from a IEE802.3af compliant injector (not supplied)
- 5v from a USB power leads (not supplied)
- Dedicated 5v power source (not supplied)

If PoE is used, it must be noted that the injector must be gigabit Ethernet compatible.

Thruput can advise on suitability of power arrangements. Please contact your sales representative for more details.

3.2 Data Cables

The Sentinel Integrated Recorder is a high-end video streaming device, and benefits from high-quality cabling.

Thruput recommends that all Gigabit Ethernet cables are CAT 5e or better, and that all digital and analogue cables are fully DVI-I compliant.

4 Installation Guide

The Sentinel Integrated Recorder is capable of emulating a monitor, or at-the-glass recording (snooping) of the video sent to a real monitor. This installation guide describes both methods.

If you experiences issues, please consult the troubleshooting section (see end of the manual) for help and advice on what to do next.

For the purpose of the guide, control and monitoring of the hardware is performed by the Thruput Record and Replay software suite. Please contact support or your local sales representative for information on what is available.

This document describes the steps involved in setting up a demonstration of the Sentinel Integrated Record system. This demonstration will also include a replay position to demonstrate playback of the captured data. The system primarily consists of the following main components:

1. The video source.
2. The recorder / NAS position.
3. The replay position.
4. Sentinel TX recorder.
5. Installer CD – Please contact support or sales if not supplied.

Each component has a minimum set of system requirements; however we would recommend a fully featured NAS such as a Dell PowerEdge R510.

4.1 Source

a) The Video Source
   a. A Dual or single link DVI graphics card.
   b. A suitable monitor e.g., 1600x1200.
   c. A passive DVI splitter.
   d. A DVI cable.
b) Sentinel TX Recorder
   a. Sentinel TX device – with USB cable.
   b. External Power supply, or a Power over Ethernet (PoE) adapter.

4.2 The Recorder / NAS Position

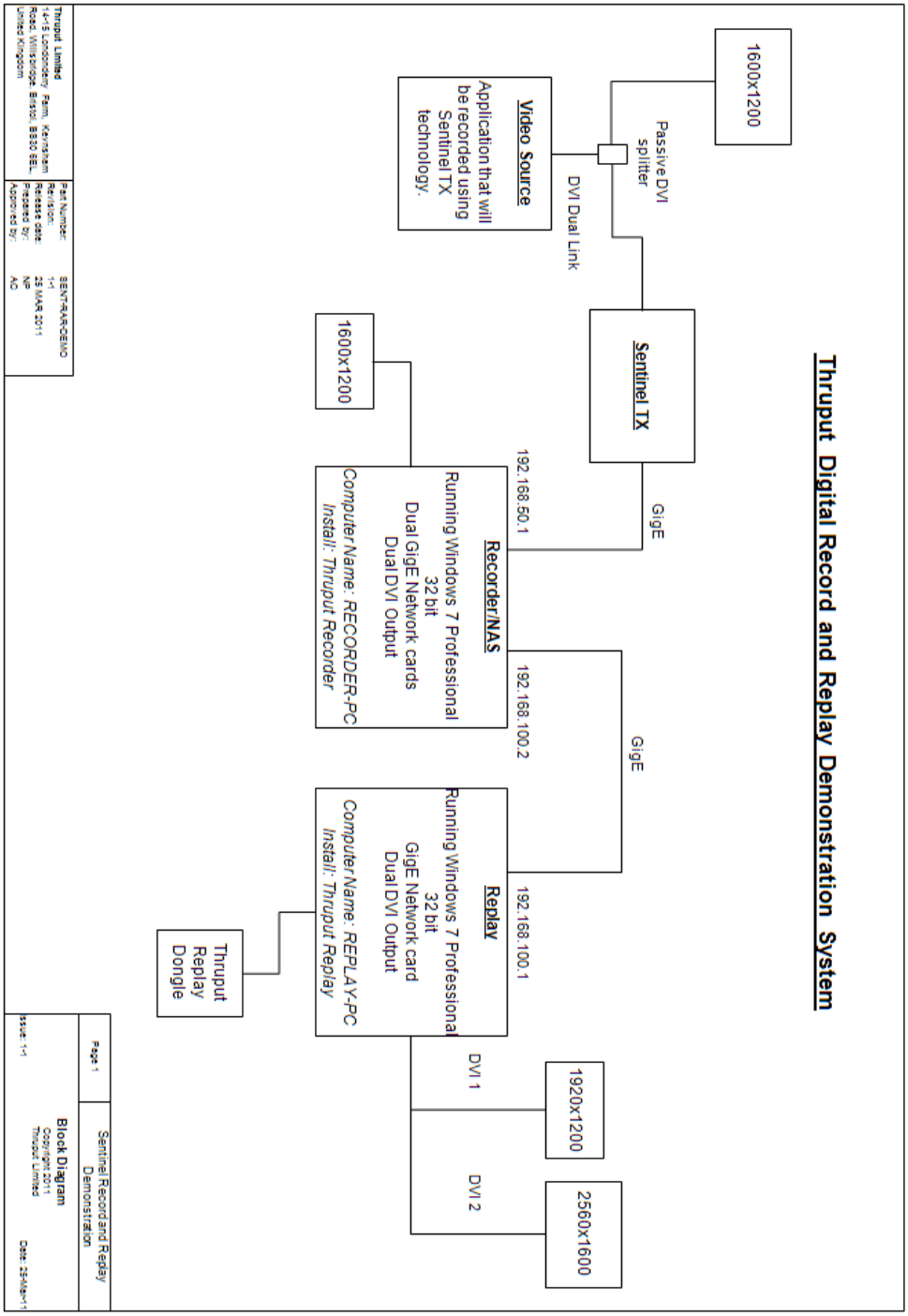
a) Window 7 Professional 32 bit Edition.
b) A suitable monitor e.g., 1280x1024 or greaterx GigE network cards.
c) Sufficient disk space for the recorded data; e.g.,
   a. 1 HDD for the Windows Operating system, min 320GB
   b. HDD for the video data e.g., 1.5TB

4.3 The Replay Position

a) Window 7 Professional 32 bit Edition.
b) Dual head DVI graphics card with support for the maximum video resolution being recorded e.g., 1600x1200 (max 2560x1600).
c) Thruput licence dongle.
d) A suitable monitor(s)
   a. Option 1: A single monitor e.g., 1920x1200
   b. Option 2: Two monitors e.g., 1920x1200 and 2560x1600

5 The Demonstration System

The following system diagram shows the general layout of the demonstration system this document refers to.



5.1 Recorder/NAS and Replay Networking

a) Set up the following IP addresses for the Recorder/NAS position; refer to Appendix 6.1 for details.
    a. IP1: 192.168.**50.1**/255.255.255.0
    b. IP2: 192.168.**100.2**/255.255.255.0
b) Set up the following IP address for the Replay position; refer to Appendix 6.1 for details.
    a. IP: 192.168.**100.1**/255.255.255.0
c) Setup the network between the Recorder/NAS and Replay positions; refer to Appendix 6.2 for details.
d) Ensure the Windows Firewall is disabled on both the Recorder/NAS position and the Replay position

5.2 Source Position

With the source computer turned off perform the following steps

a) Connect the DVI splitter to the source computer DVI output.
b) Connect one output from the DVI splitter to the chosen monitor.

(Note that in 'snoop' mode, a passive video splitter should be used to ensure that the monitor and Sentinel Integrated Recorder co-exist. If connected in direct mode, video splitters must not be used.)

c) Connect the second output to the Sentinel TX device.
d) Connect the power cables to the Sentinel TX.
e) Connect a CAT5 network cable from the Sentinel TX LAN 2 port to the RECORDER-PC 192.168.50.1/255.255.255.0 network; see section 5.1 for recorder networking.

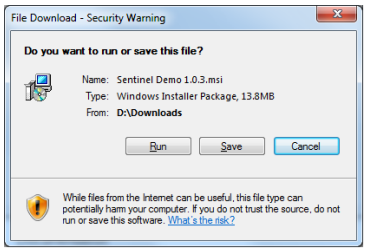
(It is recommended that no more than 12 Sentinel Integrated Recorders are connected on the same LAN to give optimum performance. Similarly, it is strongly recommended that a LAN is dedicated for use by the Sentinel Recorders as the real-time recording can occasionally generate high network traffic.)

f) Power up the source computer.
g) Check that the power LED is green (located next to the power input)
h) Check the DVI LED on the Sentinel TX is green; if no light is seen, confirm that both sides support Gigabit Ethernet, and check that the PC network card is enabled. See troubleshooting for more advice.

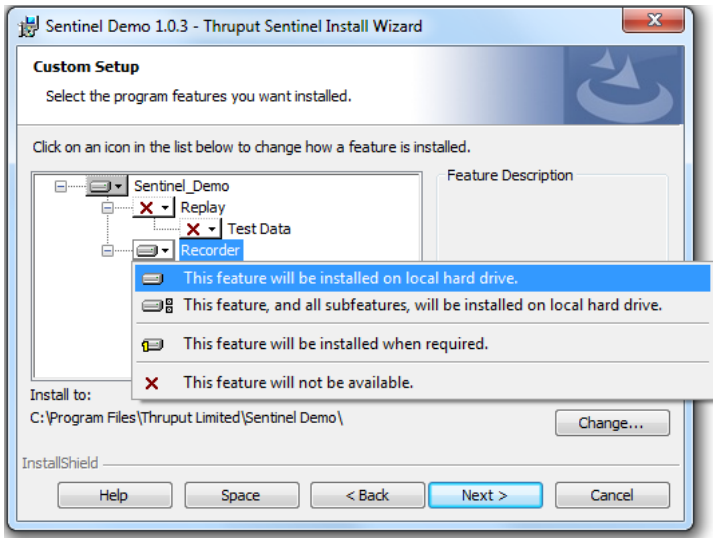
5.3 Recorder/NAS Position

It is recommended that data from the Sentinel TX device is recorded to a disk partition other than the windows system partition; ideally a second HDD would be used create a new partition.

a) Create a new disk partition labeled E:\ (Appendix 6.3)
b) Assign the correct permissions to the newly created E:\ drive (Appendix 6.4)
c) Run the installer CD on the recorder position.[1] Selecting the Recorder tab.
d) Install WinPcap accepting all defaults.
e) Install 32-bit Sentinel Recorder. A security warning[2] will require you to confirm that you wish to run the installer.

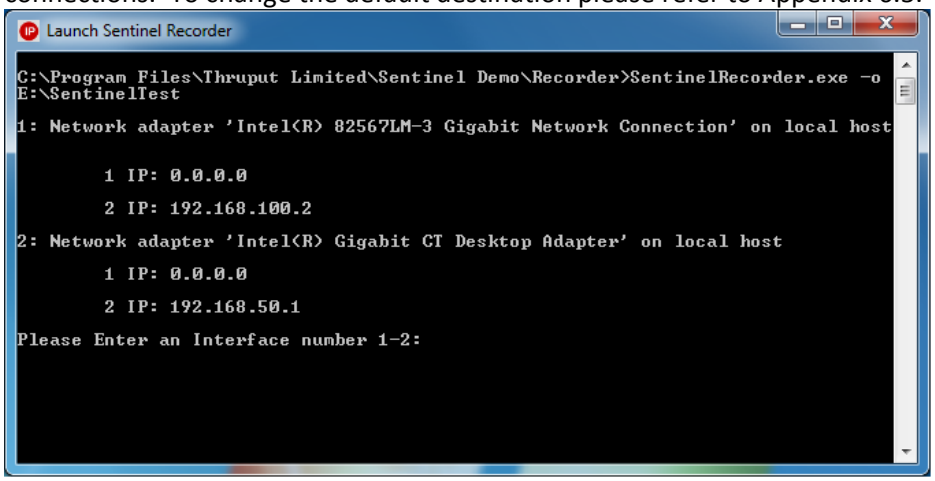

File Download - Security Warning
Do you want to run or save this file?
Name: Sentinel Demo 1.0.3.msi
Type: Windows Installer Package, 13.8MB
From: D:\Downloads
Run
Save
Cancel
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?

f) When prompted select recorder and "This feature will be installed on local hard drive".


Sentinel Demo 1.0.3 - Thruput Sentinel Install Wizard
Custom Setup
Select the program features you want installed.
Click on an icon in the list below to change how a feature is installed.
Sentinel_Demo
Replay
Test Data
Recorder
Feature Description
This feature will be installed on local hard drive.
This feature, and all subfeatures, will be installed on local hard drive.
This feature will be installed when required.
This feature will not be available.
Install to:
C:\Program Files\Thruput Limited\Sentinel Demo\
Change...
InstallShield
Help
Space
< Back
Next >
Cancel

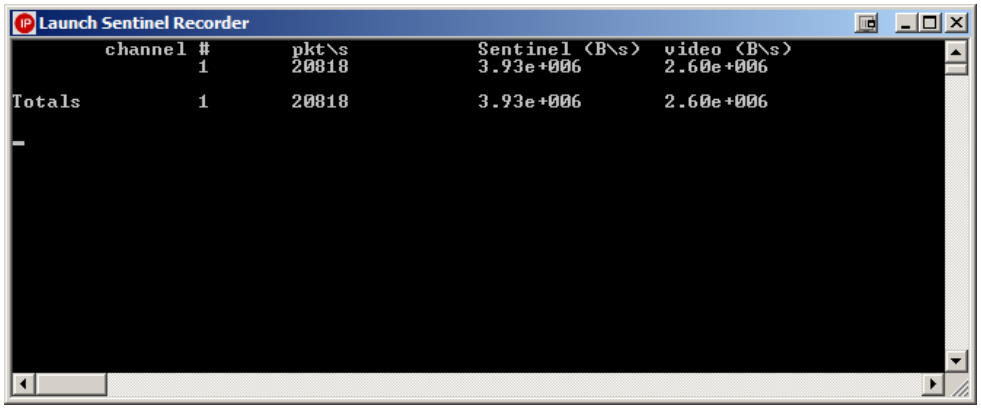
[1] The CD should auto start if it does not browse the CD and double click the index.html file
[2] Thruput software is scanned for all currently known security threats.

g) Test the Recorder Application runs correctly from the desktop icon. The recorder will display the default destination (E:\SentinelTest) as well as the available network connections. To change the default destination please refer to Appendix 6.5.

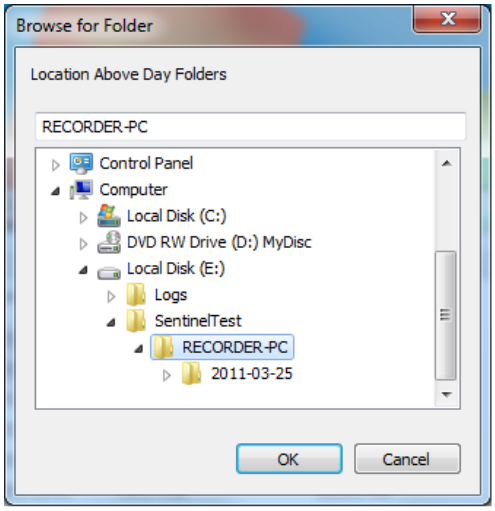

Launch Sentinel Recorder
C:\Program Files\Thruput Limited\Sentinel Demo\Recorder>SentinelRecorder.exe -o E:\SentinelTest
1: Network adapter 'Intel(R) 82567LM-3 Gigabit Network Connection' on local host
1 IP: 0.0.0.0
2 IP: 192.168.100.2
2: Network adapter 'Intel(R) Gigabit CT Desktop Adapter' on local host
1 IP: 0.0.0.0
2 IP: 192.168.50.1
Please Enter an Interface number 1-2:

h) Select the network adapter with IP address 192.169.50.1, e.g., 2, press enter and select (Y) to continue.

i) The recorder, if setup correctly will now begin to record data from the connected video source beginning at the next minute boundary. If no data info is seen please refer to the troubleshooting section.



j) Minimise the recorder and launch space-checker, navigating to directory E:\SentinelTest\RECORDER-PC, this is the folder above the day directories on your selected partition. Select ok.

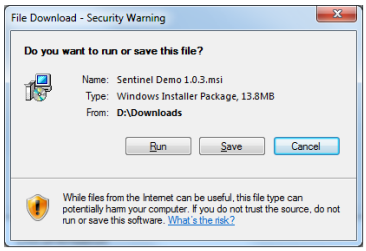


5.4 Replay Position.

Replay functionality is supplied by the Sentinel Replay application. To install the Replay applications follow the steps below.

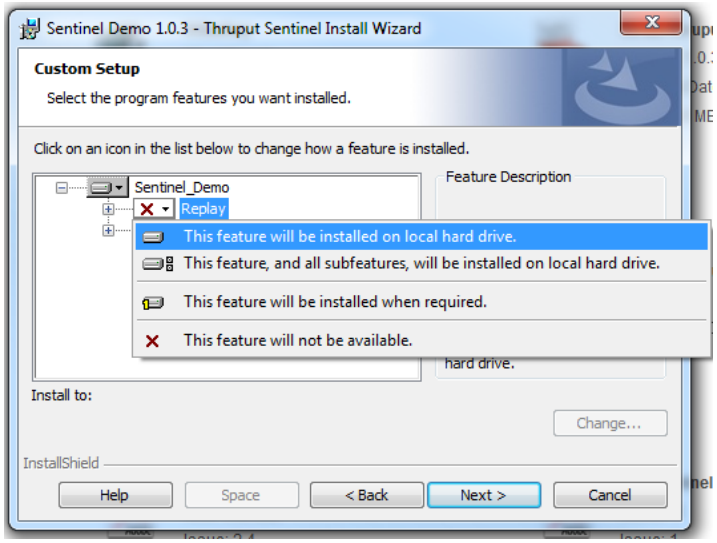
a) Run the installer CD on the replay position.[3] Selecting the Replay tab and proceed as follows:
b) Install CodeMeter accepting all defaults.

c) Install 32-bit Sentinel Replay. A security warning[4] will require you to confirm that you wish to run the installer.


File Download - Security Warning
Do you want to run or save this file?
Name: Sentinel Demo 1.0.3.msi
Type: Windows Installer Package, 13.8MB
From: D:\Downloads
Run
Save
Cancel
While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?

When prompted select replay and "This feature will be installed on local hard drive".

[3] The CD should auto start if it does not browse the CD and double click the index.html file
[4] Thruput software is scanned for all currently known security threats.

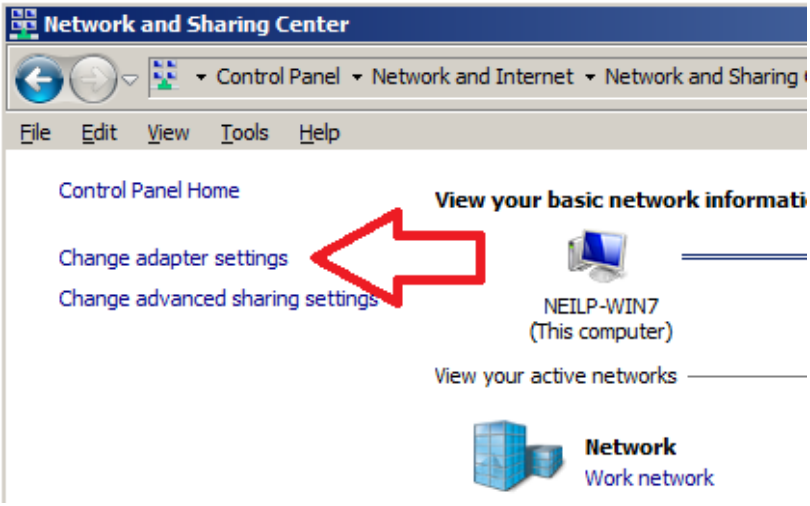

Sentinel Demo 1.0.3 - Thruput Sentinel Install Wizard
Custom Setup
Select the program features you want installed.
Click on an icon in the list below to change how a feature is installed.
Feature Description
Sentinel_Demo
Replay
This feature will be installed on local hard drive.
This feature, and all subfeatures, will be installed on local hard drive.
This feature will be installed when required.
This feature will not be available.
hard drive.
Install to:
Change...
InstallShield
Help
Space
< Back
Next >
Cancel

d) See the Sentinel Replay User Manual on the install CD for using the Replay Application.
e) See Appendix 6.6 for details on how to change the default configuration of Replay.
f) Test the network connection from the Replay position to the Recorder destination by using network neighbourhood to browse the E:\ drive you created on the recorder. Refer to the troubleshooting section if you cannot browse the E:\ drive.

6 Appendix

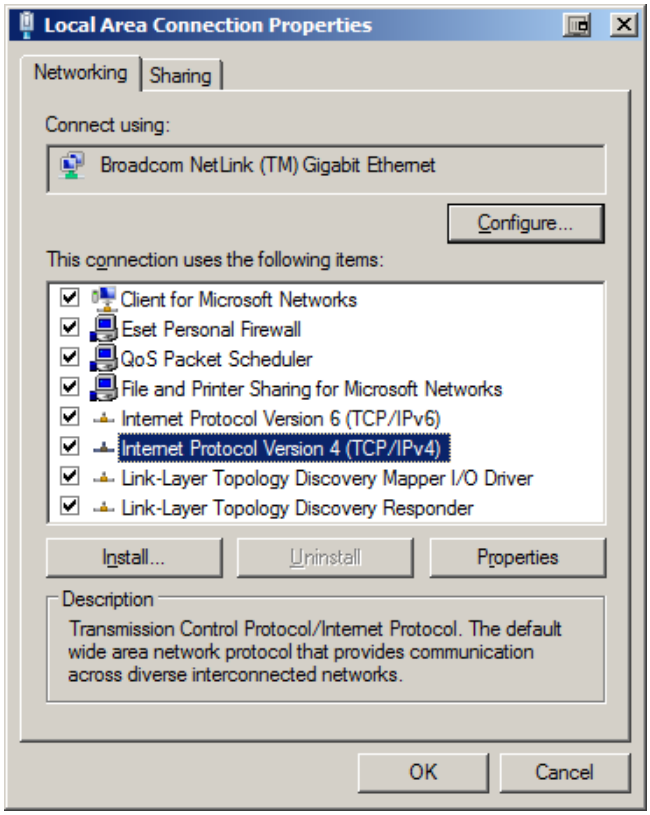
6.1 Setting a static IP address

a) From “Network and Sharing Center” in Control Panel select the “Change Adatper Settings” link.

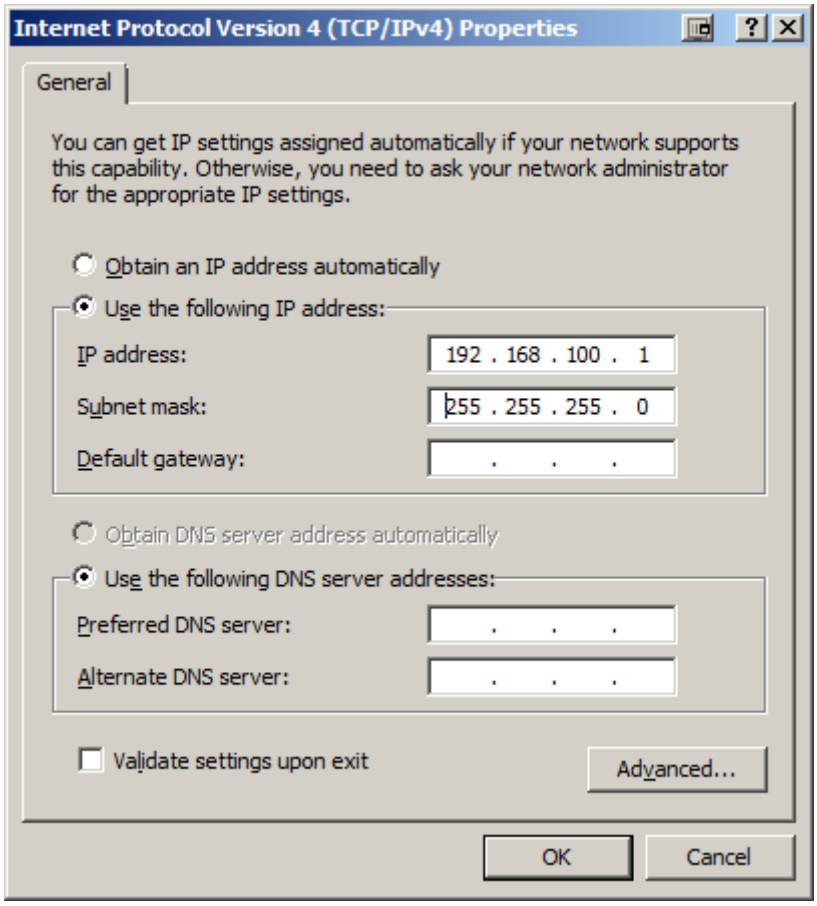


b) Right click the appropriate network adapter from the list and click properties.

c) In the connection properties dialog select “Internet Protocol Version 4 (TCP/IPv4)” and click the Properties button



d) Select the radio button Use the following IP address:

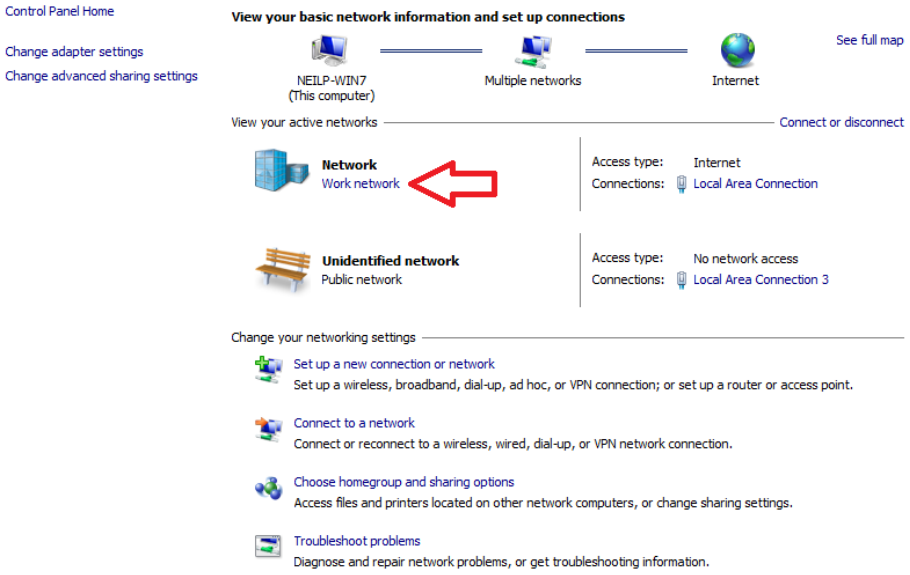

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 100 . 1
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

e) Set your IP and subnet mask accordingly

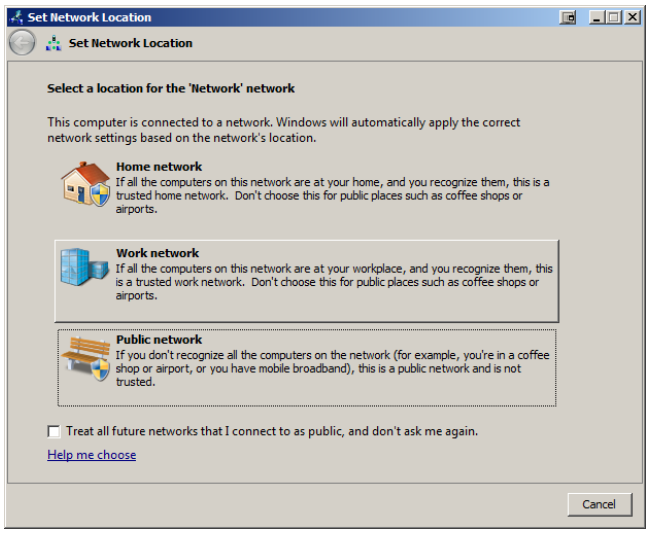
6.2 Recorder/NAS and Replay network connections

For the networking between the Recorder/NAS and Replay positions to function correctly on Windows 7 both positions need to be connected WORK network.

a) From “Network and Sharing Center” in Control Panel select the current active network as depicpted below by the red arrow.

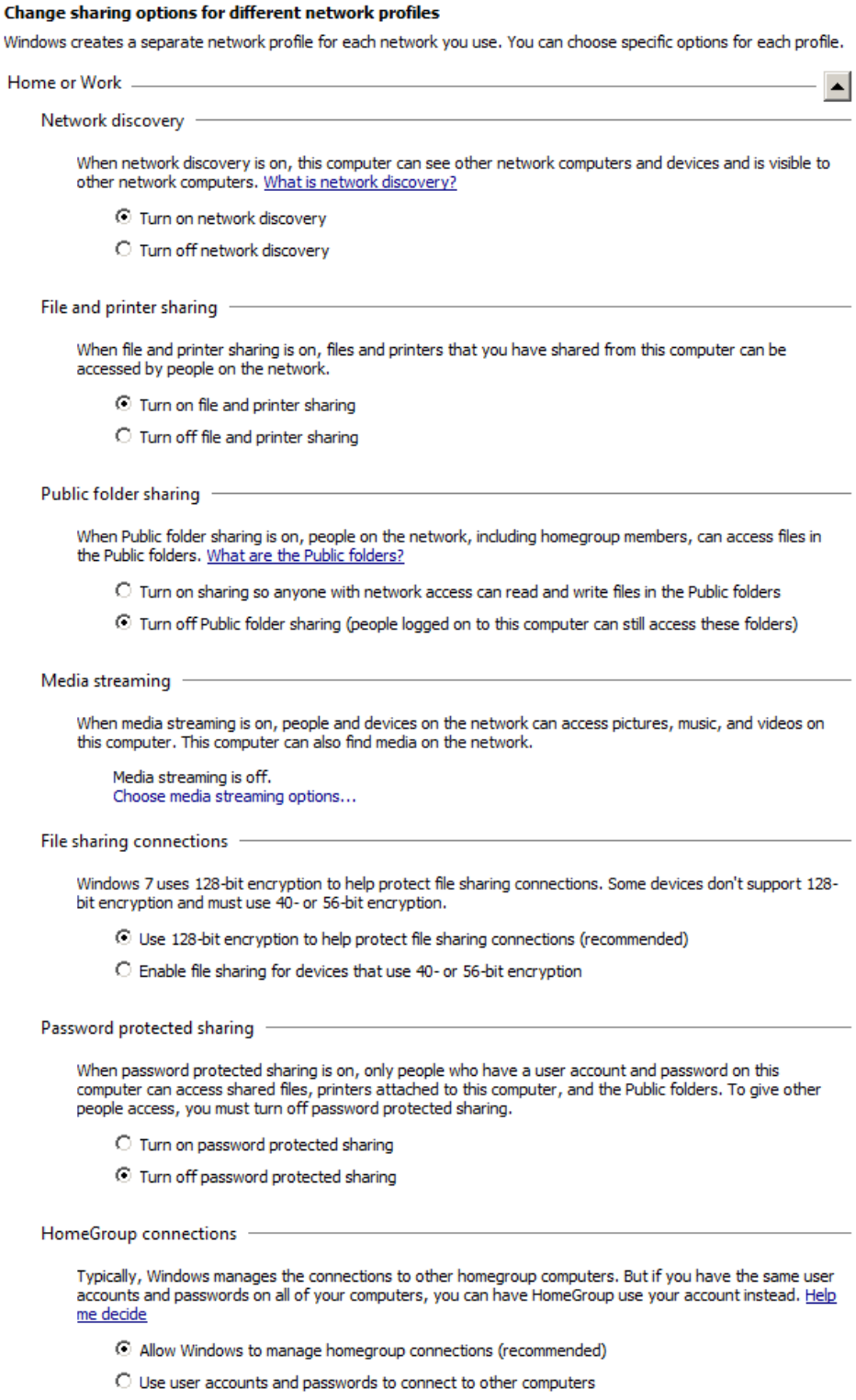

Control Panel Home
Change adapter settings
Change advanced sharing settings
View your basic network information and set up connections
See full map
NEILP-WIN7
(This computer)
Multiple networks
Internet
View your active networks
Connect or disconnect
Network
Work network
Access type: Internet
Connections: Local Area Connection
Unidentified network
Public network
Access type: No network access
Connections: Local Area Connection 3
Change your networking settings
Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.
Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.
Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.
Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.

b) Connect to the WORK network (if not already)


Set Network Location
Set Network Location
Select a location for the 'Network' network
This computer is connected to a network. Windows will automatically apply the correct network settings based on the network's location.
Home network
If all the computers on this network are at your home, and you recognize them, this is a trusted home network. Don't choose this for public places such as coffee shops or airports.
Work network
If all the computers on this network are at your workplace, and you recognize them, this is a trusted work network. Don't choose this for public places such as coffee shops or airports.
Public network
If you don't recognize all the computers on the network (for example, you're in a coffee shop or airport, or you have mobile broadband), this is a public network and is not trusted.
Treat all future networks that I connect to as public, and don't ask me again.
Help me choose
Cancel

c) From “Network and Sharing Center” in Control Panel select “change advanced sharing settings”
d) Ensure you have expanded the “Home and work” tab
e) Change the Settings:
    a. Network discovery to ON
    b. File and printer Sharing to ON

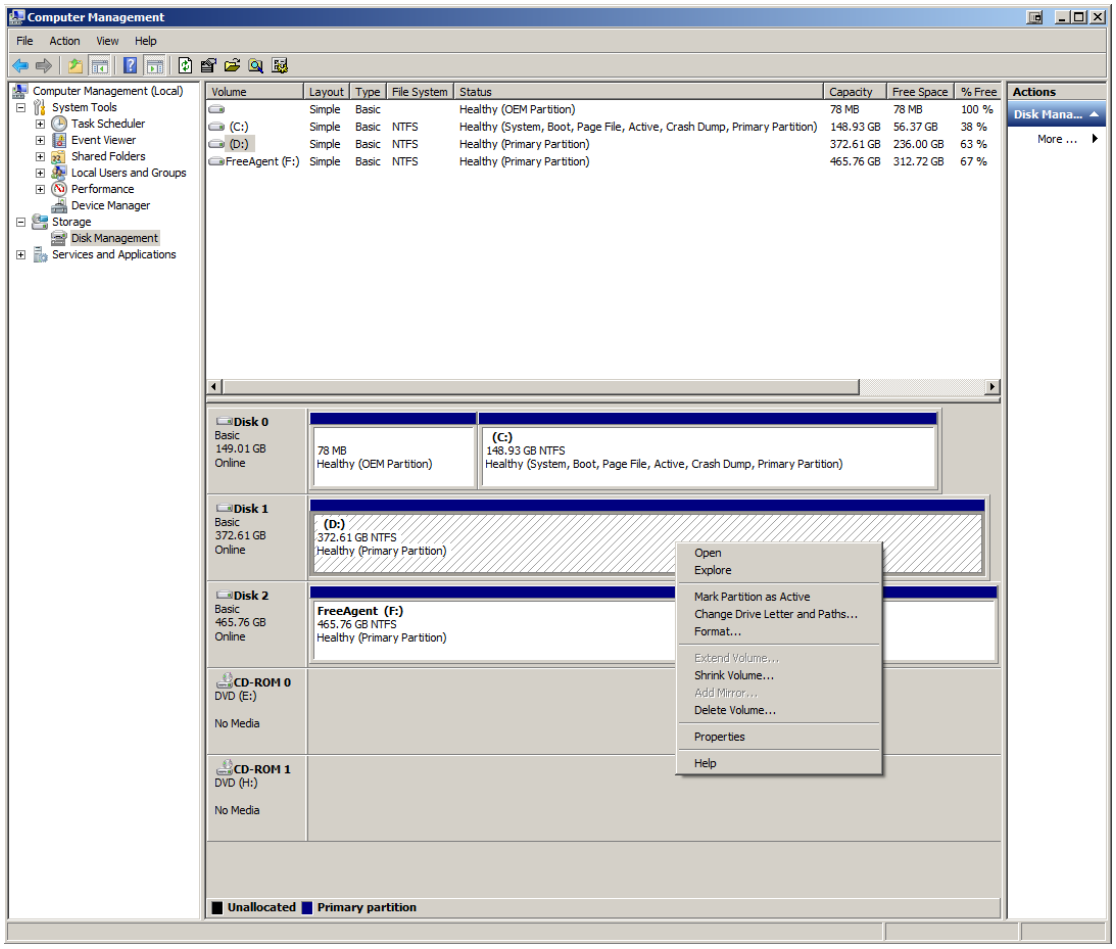
c. Password Protected sharing to OFF


Change sharing options for different network profiles
Windows creates a separate network profile for each network you use. You can choose specific options for each profile.
Home or Work
Network discovery
When network discovery is on, this computer can see other network computers and devices and is visible to other network computers. What is network discovery?
Turn on network discovery
Turn off network discovery
File and printer sharing
When file and printer sharing is on, files and printers that you have shared from this computer can be accessed by people on the network.
Turn on file and printer sharing
Turn off file and printer sharing
Public folder sharing
When Public folder sharing is on, people on the network, including homegroup members, can access files in the Public folders. What are the Public folders?
Turn on sharing so anyone with network access can read and write files in the Public folders
Turn off Public folder sharing (people logged on to this computer can still access these folders)
Media streaming
When media streaming is on, people and devices on the network can access pictures, music, and videos on this computer. This computer can also find media on the network.
Media streaming is off.
Choose media streaming options...
File sharing connections
Windows 7 uses 128-bit encryption to help protect file sharing connections. Some devices don't support 128-bit encryption and must use 40- or 56-bit encryption.
Use 128-bit encryption to help protect file sharing connections (recommended)
Enable file sharing for devices that use 40- or 56-bit encryption
Password protected sharing
When password protected sharing is on, only people who have a user account and password on this computer can access shared files, printers attached to this computer, and the Public folders. To give other people access, you must turn off password protected sharing.
Turn on password protected sharing
Turn off password protected sharing
HomeGroup connections
Typically, Windows manages the connections to other homegroup computers. But if you have the same user accounts and passwords on all of your computers, you can have HomeGroup use your account instead. Help me decide
Allow Windows to manage homegroup connections (recommended)
Use user accounts and passwords to connect to other computers

6.3 Create a new partition

Creating, formatting and changing drive letters for partitions is all done via the "Disk Management" section in the Computer Management Console (found under Administrative Tools in Control Panel).

a) Right clicking your appropriate disk gives you access to the options associated to the disk.



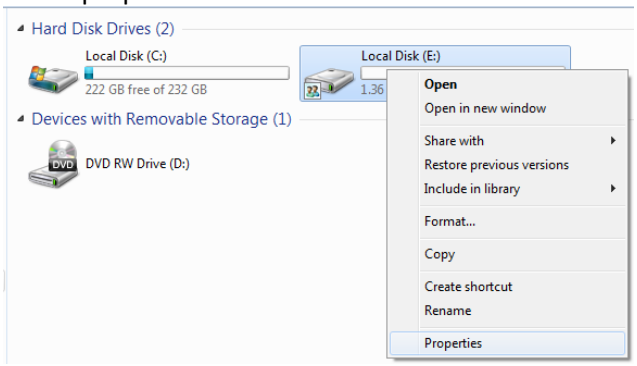
b) The format File system should be NTFS and the Allocation Size should be set to "default".

c) Assign a drive letter to the newly formatted partition. You may need to rearrange your drive letters.

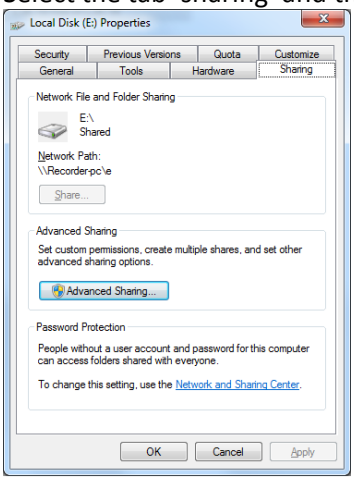
6.4 Recorder Permissions

In order for Windows Network Neighbourhood to browse the E:\ partition you created in step 5.3a the following permissions need to be set on the Recorder

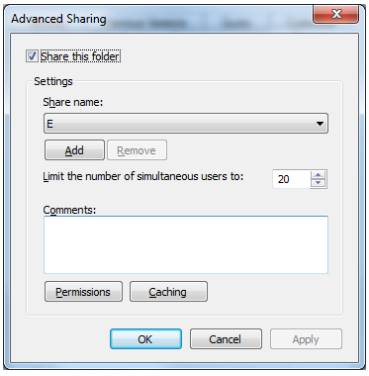
a) Open My Computer and right click the partition you created in step 5.3a e.g., E:\. Select properties from the list.



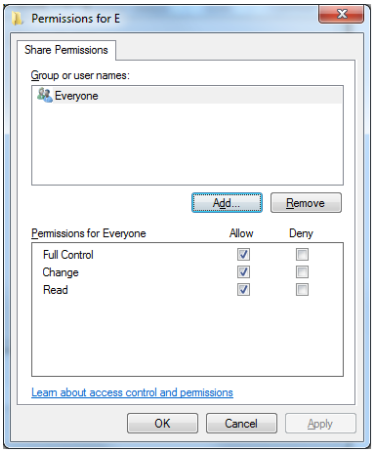
b) Select the tab 'sharing' and then click advanced sharing.



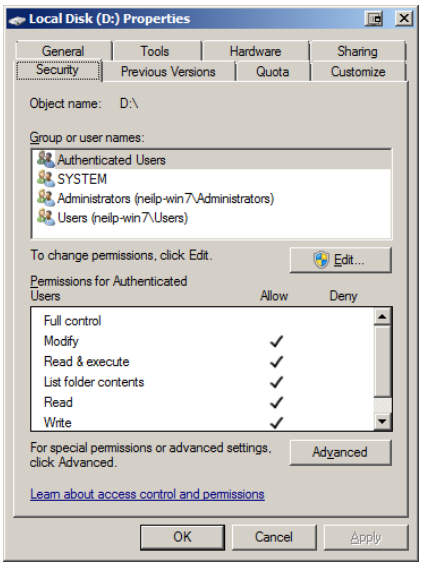
c) Make sure share this folder is ticked and select permissions.



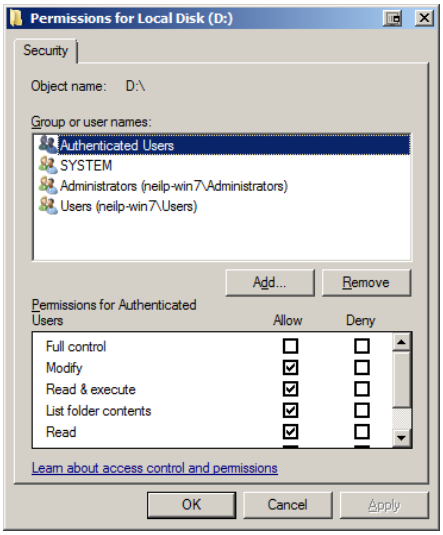
d) Select add group and name it 'Everyone' and give the group full permission controls.



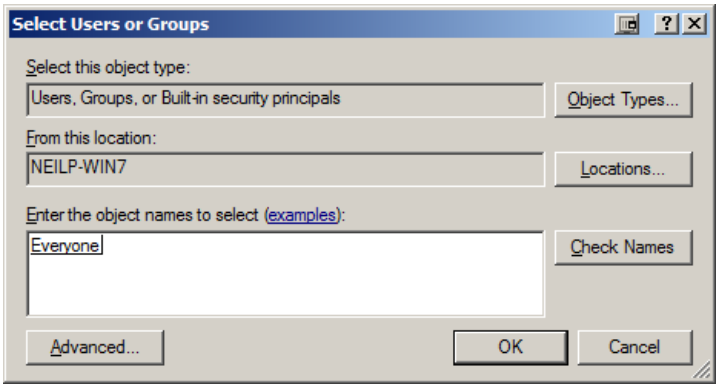
e) Select the tab 'Security' and click Edit..



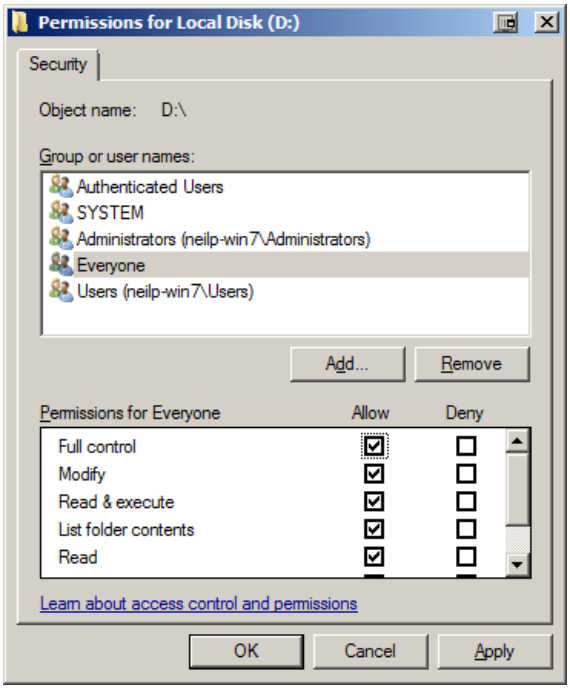
f) Select Add…



g) Enter “Everyone” in the object name edit box and click OK



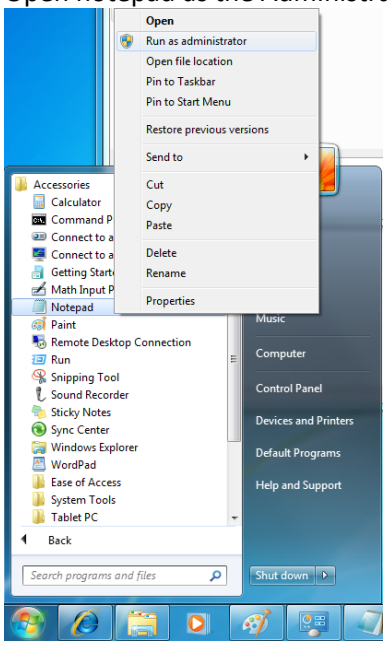
h) Select Everyone in the “Group or user names edit box and assign full control the user and click Apply



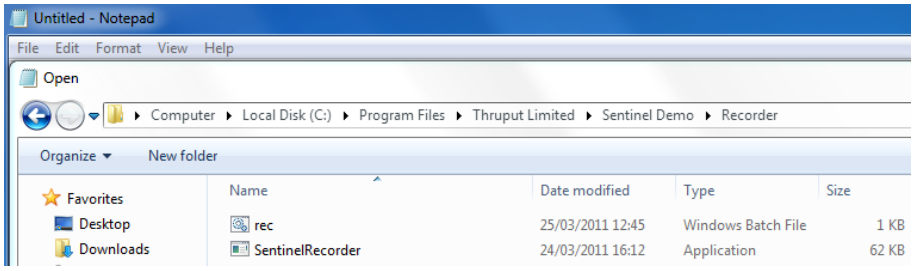
6.5 Change Recorder default settings

The data storage directory for the recorder should point to the E:\SentinelTest, if this is not the case please proceed as follows.

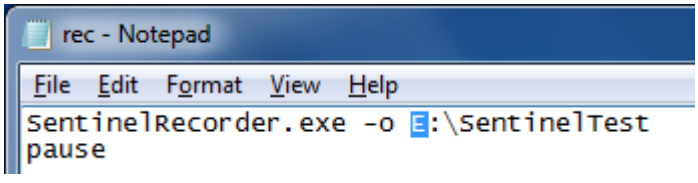
a) Open notepad as the Administrator.



b) Then open the file "[INSTALLDIR]\Recorder\rec.bat"



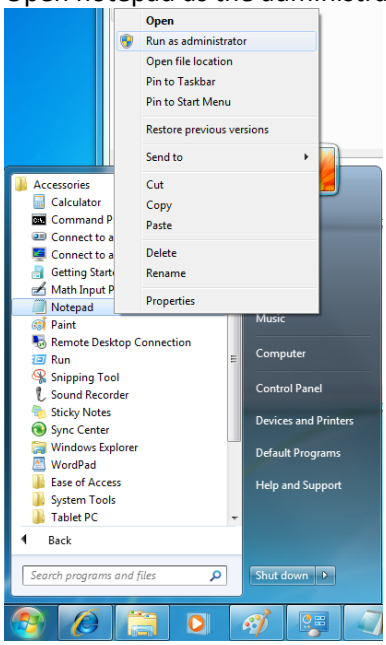
c) Amend source directory to the applicable state e.g. F:\SentinelTest



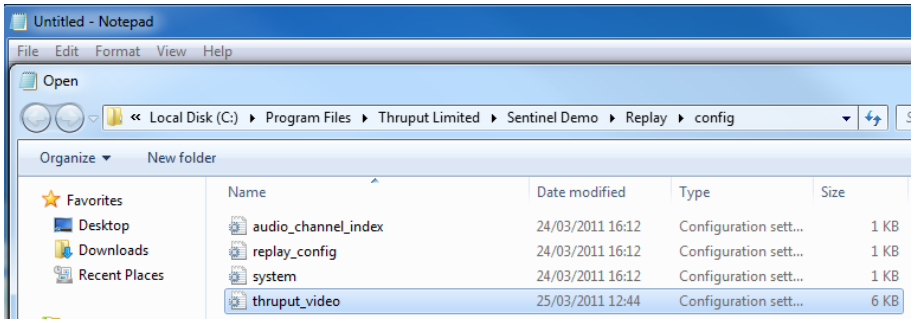
6.6 Change Replay default settings

The data storage directory on the recorder position should point to \\RECORDER-PC\E\SentinelTest\ RECORDER-PC\, if this is not the case please proceed as follows

a) Open notepad as the administrator.



b) Then open the file "[INSTALLDIR]\Replay\Config\thruput_video.ini"



c) Amend Location directory to your choosen location ending the string with a trailing back slash
e.g. \\MY-REC\F\MYROOT\MY-REC\

Note that the name of the PC appears twice in the Locaton string; both instances need to be changed.

Once configured, use the Sentinel Replay to playback a time-slice from the data recorded earlier.

Figure 4: SENTINEL INTEGRATED RECORDER FULLY OPERATIONAL

Your installation is now complete.

6.7 Further information

Further information on the Thruput Record and Replay can be found in the User Guide.

Please consult your Thruput Sales contact for help with adding Sentinel Integrated Recorder to your system.

For any other help please contact the Thruput support team.

7 Troubleshooting Guide

If you experience any problems with the above, please see if you problem is solved within this trouble shooting guide first.

a) NAS/RECORDER

Symptom	Likely cause(s)	Remedy
No network connection to source-pc.	IP addresses setup incorrectly, connections incorrect.	Check firewall disabled on recorder. Make sure the network connection between source and recorder is correctly assigned see 2.1. Check sentinel TX is connected correctly and power is on. See 2.2. Restart both the sentinel and source-pc
No network connection to replay-pc.	IP addresses setup incorrectly, connections incorrect or permissions not set up.	Check firewall disabled on recorder + replay. Try to ping the replay position to check connected. No Response = see steps 2.1 and ensure network setup with the correct IP addresses. If connection still not present then see diagram in steps 2.0 to ensure connections are setup correctly. Ping worked but unable to see connection = see 2.3 b) ensure permissions are set up correctly.
Not recording any data.	Firewall, network adapter, sentinel TX or source-pc.	Check firewall disabled on recorder. Recording will not start until a new minute has begun. Make sure the network connection between source and recorder is correctly assigned see 2.1.

		Check sentinel TX is connected correctly and power is on. See 2.2. Restart both the sentinel TX and source-pc.
Recording to incorrect directory.	Data not being recorded to the correct directory.	Check there if there is an E:\ Drive on the recorder. If yes = see 2.3 j) navigate to the folder above the day entries. If no partition at all = see 2.3 a) create a partition (E:\ id the default drive used for this install). If yes but named e.g. F:\, G:\ H:\ & so on. = see 2.3 g) to change the default destination folder.

b) REPLAY

Symptom	Likely cause(s)	Remedy
No network connection to recorder-pc.	IP addresses setup incorrectly, connections incorrect or permissions not set up.	Check firewall disabled on recorder + replay. Try to ping the replay position to check connected. No Response = see steps 2.1 and ensure network setup with the correct IP addresses. If connection still not present then see diagram in steps 2.0 to ensure connections are setup correctly. Ping worked but unable to see connection = see 2.3 b) ensure permissions are set up correctly.
Cannot open replay.	CodeMeter problem.	Check to make sure the code meter license key has been inserted into the replay position. Ensure CodeMeter software has been installed on the replay position.
Cannot access recorded	Replay looking in	To change the directory that replay

data.	the wrong directory.	looks in see 2.4 e). Check the permissions are correct on both replay & recorder, see 2.3 b). should be able to access the files via neighborhood network.

c) SENTINEL TX

Symptom	Likely Cause(s)	Remedy
Power LED not green (located to the left of external 5V PSU connector)	No power supplied.	Check that the unit is power supplies are turned on (either PoE, external AC/DC or USB) – n.b. the unit can be supplied from one or more sources. If still not LED, but you are able to communicate with the unit (i.e. via software or through other LEDs), then the power LED has failed. If there are still problems contact support.
DVI LED not green (located to the right of the DVI connector)	Video source not present,	If in at-the-glass mode, check that a valid picture is still present on the monitor i.e. there is data on the cable. If in direct connection mode, or no video present on the monitor, check the video settings on the video source computer i.e. If Windows, right-click on the desktop to bring up the display control panel. Check that the video card can 'see' the video card, and that the resolution is valid. Ensure that DVI Integrated resolutions are 1600x1200 or lower for analogue and 1920x1200 or lower for digital connections. Ensure that the associated display is enabled (if it is a second monitor, then it may need 'enabling' from software). If there is data on the second monitor, but the DVI LED is still not coming on, then check that the unit is powered. If the video source computer cannot detect the attached Sentinel Recorder, restart the

		computer as it may need to refresh the list of known monitors. If there are still problems contact support.
Network connection LED is not green (valid connection)	No LAN present, or not 1000-baseT	Check the cables. The Cat5e (or greater) cable should give a green 'connection' LED if connected to a powered 1000-BaseT (GigE) LAN switch or computer. Check that the unit is powered. If the second connector is also failing, then try a different LAN connection and/or cable. If there are still problems contact support.
Network data LED is not flashing amber (i.e. data not being sent/received)	No valid DVI to transmit or no LAN present	First ensure that the LAN connection is showing a green LED (see above to troubleshoot). Check that the DVI LED is showing a green LED (see above to troubleshoot). Connect to other port – software may have disabled one of the ports. Test that connection can be made using the Sentinel Management software i.e. is it possible to detect the software via the network. If connection is possible, make sure that the network port has not being disabled in software. Test that data is not being transmitted by using the Sentinel Recorder software i.e. is data arriving at the recorder. If there are still problems contact support.
User LED does not respond to software control	Wrong network port in use	The user LED is only controlled by software using the network ports. Check that the network is set-up correctly (see above). The user LED can be controlled by Sentinel Management software. Ensure that the correct command is being set, and that communications is possible (does the unit populate the software list)

		If communications are possible, but the LED does not respond ensure that no other units are on the network as these may be interfering. Ensure that the correct command is being sent to the unit. See the network interface user guide. If there are still problems contact support.
Unable to record video data	Recorder service is not configured correctly or out of disk space	Check connectivity. Is the Sentinel Recorder connected to the NAS recorder, and is it powered. Check that the Sentinel Recorder software has the correct configurations e.g. NAS folder exists and the correct computer LAN has been chosen (see network stats to see data arriving) Check there is sufficient disk space to record new data. Check that the Sentinel Recorder has both the Video (green) and LAN (green + flashing amber) LEDs active. Check that the Sentinel Recorder software is running on the NAS recorder. If there are still problems contact support.
Analogue recording is not tuned (i.e. phase, brightness, contrast)	Analogue settings are not optimal	If in at-the-glass mode, check the quality of the video on the monitor. Tune the monitor first to ensure that source video is valid. Check that the Sentinel Recorder is set to automatic mode (default) as this should get a sufficient video quality for most applications. If monitor is still showing a poor image, and/or automatic mode does not tune the video then check the video card settings as the resolution may be invalid. If the video is visible, but not optimized then use the software to adjust phase, brightness, contrast and horizontal/vertical alignment. Use Sentinel Live Viewer (or equivalent) to customize the video settings.

		If there are still problems contact support.
Recorded Video File Sizes larger than expected	Non-optimal source video	The Sentinel Recorder is optimized for video that compresses well using the PNG algorithm (as opposed to the JPG algorithm). If the source data is constantly changing, or has lots of detail (e.g. full-motion video) then a larger file size should be expected. Check video cables – poor quality cabling, or badly terminated Y-splits can cause noise to be present on the cable. This noise will be recorded, and compressed, causing an increase in file size. To fix ensure that good quality cabling is used, and that cable runs are kept to a minimum. Check that the monitor is switched on (at-the-glass recording) and that it is not running a screen saver. Check the recorded frame-rate. Higher frame-rates result in larger video files. Check the resolution. Higher resolutions will result in larger video files. Check the source video. Large on-screen changes will result in larger video files. For digital capture, check that the source video card is transmitting video at the "native" resolution for the monitor. If the video is being scaled by the video card then there may be extra details that are causing the file size to increase. For analogue capture, check that the quantization filter has been enabled (and set appropriately) as this will help reduce sampling noise and therefore reduce the size of video frames. If there are still problems contact support.
Recorded data has noise or is corrupt (but files are	Non-optimal video source	Check other files, if just one file is showing the fault then it may contain invalid data i.e. file corrupted on disk. Data should be replaced with redundant data source at the earliest

not missing)		opportunity. If all data shows the fault, then follow the trouble-shooting steps for "***Recorded Video File Sizes larger than expected***" (above). If there are still problems contact support.
Missing video files	Recorder service was stopped or Sentinel Recorder disconnected	If data is currently not being received, see "***Unable to record video data***". Check the recorder application logs to see if the application was running continuously, and that no faults were reported. Check the network logs (both NAS computer, and LAN switch) to see if network disconnections coincide with gaps in data. Check that redundant NAS data has the missing data. If so, data should be copied across at the earliest opportunity to ensure that redundant data is maintained. ***Sentinel Gap Filler*** can automate this task. Check that NAS disk space is available, and that the disk space has a minimum of 10% available at all times. The ***Sentinel Spacechecker*** can be used to automate this task. If there are still problems contact support.
Unable to decode/replay data	Software upgrade necessary	If data is corrupt or shows video noise, see "***Recorded data has noise or is corrupt (but files are not missing)***" Contact support to ensure that the latest version of replay/decode is being used. Check that the data is accessible via the network and has sufficient permissions to read the data remotely. The Sentinel Recorder captures difference frames, so ensure that sufficient data has been captured within the time-slice you are trying to replay. A larger time-slice may allow the data to be viewed.

		If there are still problems contact support.
Unable to monitor or control unit	Wrong network port in use	Test basic connectivity by attempting to control the user LED or read the unit serial number. If this fails, see "***User LED does not respond to software control***" Not all commands are supported on all hardware platforms. Consult the Sentinel Command Matrix to ensure that the command is valid for your hardware variant. If there are still problems contact support.
Unable to select required resolution (video source not showing resolution).	At-the-glass (EDID) mode incorrectly set	Check that the DVI LED is present. Check that at-the-glass mode (EDID mode) is set correctly for the system. i.e. EDID table must be disabled during at-the-glass capture as it will interfere with the monitor's settings. Conversely, EDID table must be enabled when connected directly as it is emulating the monitor. The source video computer may need restarting to detect the video mode. The video card may not support the required resolution. Non standard resolutions may require a forced configuration in the host computer. Check that the required resolution falls within the VGA or DVI-I specifications. If there are still problems contact support.
Unable to upgrade the unit	Virtual COM port driver missing	Check that the USB port is connected to the host computer. Ensure that the Sentinel Virtual COM port driver is installed. Contact support to obtain the latest version. Check that the correct COM port number is selected (see hardware properties). Check that the correct COM settings are selected (115200 baud; 8-bit data; 1-stop; no

	flow-control) within the USB driver (see hardware properties). Check that the Sentinel Upload Tool is installed. The latest version can be obtained from support. See the Upload Tool user guide for more trouble shooting advice. If there are still problems contact support.

To contact support, please email support@thruput.co.uk or contact your sales representative. When communicating with support, please include all relevant details and supply information such as the unit serial numbers and product part number.